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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,590	03/19/2004	Larry E. Hand	ELAN-01189US1	9253

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EXAMINER	
SELLERS, DANIEL R	

ART UNIT	PAPER NUMBER
2614	

NOTIFICATION DATE	DELIVERY MODE
10/05/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OFFICEACTIONS@FDML.COM

Office Action Summary	Application No.	Applicant(s)	
	10/805,590	HAND ET AL.	
	Examiner	Art Unit	
	DANIEL R. SELLERS	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5-7,17-19,22 and 23* is/are allowed.

6)☒ Claim(s) *1,2,8-16,20 and 25* is/are rejected.

7)☒ Claim(s) *3,4,21,24 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 9/3/09 have been fully considered but they are not persuasive.

2. Regarding **claim 1**, the combination of Yasuda and Cory teaches the features of the claim. The applicant states that Cory does not teach a target difference in one of the channels (e.g. Cory's master channel). The examiner does not necessarily agree with that statement, because Yasuda is relied upon to teach a target difference (e.g. Yasuda's optimal address difference CT) (see ¶ 0041, 0043, and 0049-0050). Cory is relied upon to teach a remainder of channels, which are synchronized to the master channel, and the synchronization steps read on a target difference being an actual difference for the remainder of channels. Cory teaches alignment blocks or sequences to match the separate channels (see column 3, line 66 - column 5, line 14). Therefore, Cory is teaching synchronizing slave channel buffers to a master channel buffer, and Yasuda is teaching a predetermined (e.g. optimum) target difference for the master channel buffer to work towards.

3. Regarding **claim 2**, see the preceding argument with respect to claim 1. The combination teaches these dependent features of claim 1.

4. Regarding **claim 8**, see the preceding rejection with respect to claim 1. The combination teaches a method with these features.

5. Regarding **claim 9**, see the preceding argument with respect to claim 1. The combination further in view of Cooke teaches these dependent features of claim 8.

6. Regarding **claims 10-13**, see the preceding argument with respect to claim 1. The combination teaches these dependent features of claim 8.

7. Regarding **claim 14**, see the preceding rejection with respect to claim 1. The combination teaches a system with these features.

8. Regarding **claims 15 and 16**, see the preceding argument with respect to claim 1. The combination teaches these dependent features of claim 14.

9. Regarding new **claims 20 and 25**, see the following rejections under 35 USC 103.

Claim Rejections - 35 USC § 103

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. **Claims 1, 2, 8, 10-16, 20, and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda (previously cited) further in view of Cory (previously cited).

12. Regarding **claim 1**, Yasuda teaches a multi-channel audio amplifier system (¶ 0011) comprising:

a plurality of audio amplifier channels (¶ 0025 and ¶ 0027), *wherein each channel includes*
a sample rate converter (¶ 0026, figure 1, units 110, 120, and 130, and figure 2) *configured to*
receive samples of an input audio data stream (¶ 0028 and figure 1, unit 1),
store the samples in an input buffer, retrieve samples from the input buffer (¶ 0036-0037 and figure 2, unit 13), *and*
convert the samples to a re-sampled audio data stream (¶ 0039 and figure 2, unit 21) , *and*
a buffer management unit coupled to the input buffer (¶ 0041 and figure 2, unit 25) *and configured to maintain*
a write pointer indicating a position in the input buffer to which a next sample will be written (¶ 0041) *and*

a read pointer indicating a position in the input buffer from which a next sample will be read (¶ 0041),

wherein the buffer management unit is configured to determine an actual difference between the values of the read and write pointers (¶ 0043),

wherein the buffer management unit is further configured to control a rate at which samples are read from the input buffer to achieve a target difference between the values of the read and write pointers (¶ 0049-0050);

wherein for a first one of the channels, the target difference comprises a predetermined value; and

wherein for the remainder of the channels, the target difference comprises the actual difference between the values of the read and write pointers of the first one of the channels.

Yasuda teaches a PWM, or class-D, amplifier for use in a multi-channel system, wherein a controller directs the read and write pointers in several channels (see figure 1, units 101, 110, 120, and 130). Yasuda however does not disclose the features of a target difference for a first of the several channels, and an actual difference equal to the target difference for the remainder of the channels.

Cory teaches a method for synchronizing plural channels in an elastic buffer, or FIFO memory (column 1, lines 12-52, column 2, line 62 - column 3, line 16, and column 3, line 66 - column 5, line 14). Cory does not teach audio data, however it would have been obvious at the time of the invention for one of ordinary skill in the art to contemplate the usefulness of this FIFO buffer control, because Yasuda also teaches FIFO buffers, or ring buffers. Specifically, Cory teaches controlling the read pointer to achieve a target difference for a first one of the channels (column 19, lines 7-23), controlling the read pointers of the slave buffers based on the actual difference in the master buffer (column 29, lines 56-66). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Yasuda and Cory for the purpose of synchronizing the plural channels and reducing misalignment of the audio data.

13. Regarding **claim 2**, the combination teaches the system of claim 1, further comprising these features. It is implicit there is an interconnect to convey the actual difference between the first channel and the remainder channels as taught by the master-slave method by Cory.

14. Regarding **claim 8**, see the preceding argument with respect to claim 1. The combination of Yasuda and Cory teaches these features.

15. Regarding **claim 10**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, wherein the method is implemented in a plurality of sample rate controllers.

16. Regarding **claim 11**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 10, wherein the buffers comprise input buffers of the sample rate controllers.

17. Regarding **claim 12**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 10, wherein each sample rate controller is implemented in a channel of a multi-channel audio amplification system. Yasuda teaches each sample rate controller converts two channels, and illustrates in figure 1, three separate controllers for six channels of audio. It would have been obvious to separate each controller to handle one channel individually and double the components so that six controllers convert six channels.

18. Regarding **claim 13**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, further comprising transmitting the difference between the read and write pointers of the first one of the buffers from a

buffer management unit in the first one of the buffers to buffer management units in the remainder of the buffers (see Cory, column 22, lines 25-40 and column 29, lines 56-66).

19. Regarding **claim 14**, see the preceding argument with respect to claim 1. The combination teaches a system comprising these features.

20. Regarding **claim 15**, see the preceding argument with respect to claim 3. The combination teaches these features.

21. Regarding **claim 16**, see the preceding argument with respect to claim 4. The combination teaches these features.

22. Regarding **claim 20**, see the preceding rejection with respect to claim 1. The combination teaches the system of claim 1, wherein

the target difference for the first one of the channels is constant (see Yasuda, ¶ 0041, 0043, and 0049-0050); *and*

the target difference for the remainder of the channels is variable (see Cory, column 3, line 66 - column 5, line 14 and column 29, lines 56-66).

In the combination, Yasuda teaches a predetermined target difference (e.g. the optimal difference), which implies it is a constant. In the combination, Cory teaches that the master channel controls channel bonding, or alignment, of the remainder of channels, which implies that the remainder target difference is variable depending on how close the master channel is to the optimum rate at any given moment.

23. Regarding **claim 25**, see the preceding rejection with respect to claim 20. The combination teaches the system of claim 14 with these features.

24. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yasuda and Cory as applied to claim 8 above, and further in view of Cooke (previously cited).

25. Regarding **claim 9**, see the preceding argument with respect to claim 1. The combination teaches the method of claim 8, wherein the method is implemented in a multi-channel audio amplification system. The combination teaches these features, however does not explicitly state the convolution operation uses polyphase filter coefficients (Yasuda, ¶ 0067-0068).

In a related art, Cooke teaches the use of an input buffer in a sample rate conversion system (abstract and figure 4). Specifically, Cooke teaches the use of polyphase filter coefficients (column 5, line 58 - column 6, line 10). It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teachings of Yasuda, Cory, and Cooke for the purpose of producing higher quality audio. Cooke teaches the polyphase filter coefficients produce output data approximating signal characteristics of input data as if it had originally been sampled at the resampled rate (column 6, lines 1-3).

Allowable Subject Matter

26. **Claims 3, 4, 21, 24, and 26** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

27. **Claim 5-7, 17-19, 22, and 23** allowed.

28. Regarding **claim 5**, the prior art does not appear to teach or reasonably suggest an error signal transmitted to the low pass filter to control a sample rate count.

29. Regarding **claims 6 and 7**, see the preceding argument with respect to claim 5. These claims depend from claim 5, wherein the prior art does not appear to teach or reasonably suggest the features of claim 5.

30. Regarding **claim 17**, see the preceding argument with respect to claim 5. The prior art does not appear to teach or reasonably suggest these features.

31. Regarding **claims 18 and 19**, see the preceding argument with respect to claim 17. These claims depend from claim 17, wherein the prior art does not appear to teach or reasonably suggest the features of claim 17.

32. Regarding **claims 22 and 23**, see the preceding argument with respect to claim 5. These claims depend from claim 5, wherein the prior art does not appear to teach or reasonably suggest the features of claim 5.

Conclusion

33. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Curtis et al., US 6,389,139 B1 (previously cited) - teaches a network audio system using in a serial connection (see figure 7);

O'Brien, US 6,429,737 B1 (previously cited) - teaches a multi-channel audio amplifier using PWM amplification and utilizing a global system timing (abstract and figure 1, unit 123 and 124);

Midya, US 2003/0042976 A1 (previously cited) - teaches a PWM amplification system using sample rate converters (see figures 1 and 8); and

Stanley, US 6,683,494 B2 (previously cited) - teaches another PWM amplification system using a master-slave clock system (see figure 1, units 18 and 30, figure 4, units 18, and 232, and column 10, lines 51-60).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL R. SELLERS whose telephone number is (571)272-7528. The examiner can normally be reached on Monday to Friday, 9am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz can be reached on (571)272-7499. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel R. Sellers/
Examiner, Art Unit 2614
/CURTIS KUNTZ/
Supervisory Patent Examiner, Art Unit 2614